

EXHIBIT 13
PP. 120-146

You can also display the internal data fields of the vector files by turning on the Table Window for the selected vector file (see "[Viewing Vector Data Fields](#)" below for more information).

The Keyhole client supports the following kinds of GIS Vector file formats:

Note: Most vector data comes as a collection of related files that operate together to produce all the vector data displayed in the Keyhole client viewer and in the table view. The required support files for each format are noted, where relevant. Be aware that if expected data is not displaying in the viewer, it might be due to missing support files.

- **MapInfo (TAB)**

Required files:

- MAP
- ID
- DAT

- **ESRI Shape (SHP)**

Required files and information:

- SHX
- Projection information, which can either be built into the SHP file or defined in a separate file with a PRJ extension
- DBF (for viewing field data)
- **US Census Tiger Line Files (RT1)**
- **MicroStation (DGN)**

Note: The Keyhole client supports only 2-dimension DGN files.

- **Generic Text (CSV, TXT)**

You can use generic text files to create your own point data for use in the Keyhole client. See "[Using Generic Text Files to Create Point Data](#)" on page 128 for details.

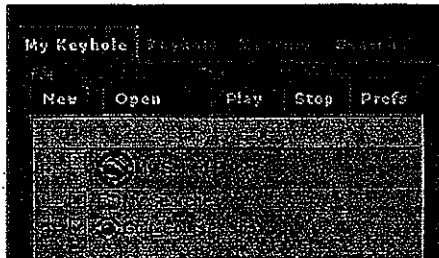
The following steps outline the basic process involved in importing vector data:

1. Before importing large vector files, turn off the Table Window for best performance (select Table from the View menu to turn on or off).
For example, populating a 22000 x 20 table takes about 5 minutes on a 2.5 GHz machine. If the table display is turned off, this step is skipped.

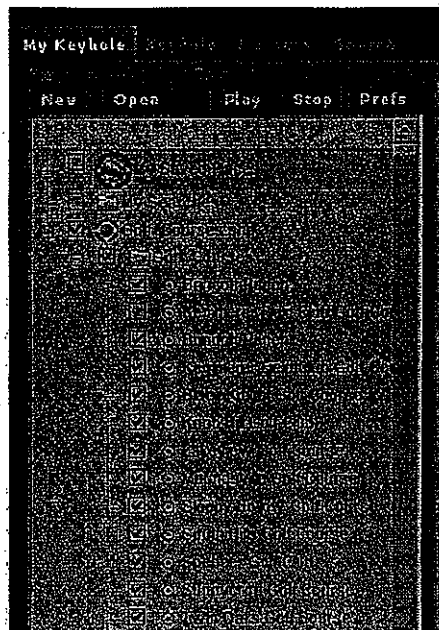
2. Use any one of the following methods to open the vector file in the Keyhole client:
 - Select Data Importer from the File menu.
 - Click on the Open button beneath the My Keyhole tab.
 - Drag the desired file from an explorer window and drop it over the viewer.

Note: You can also open a file from a machine on the network using the standard Windows browse mechanism.

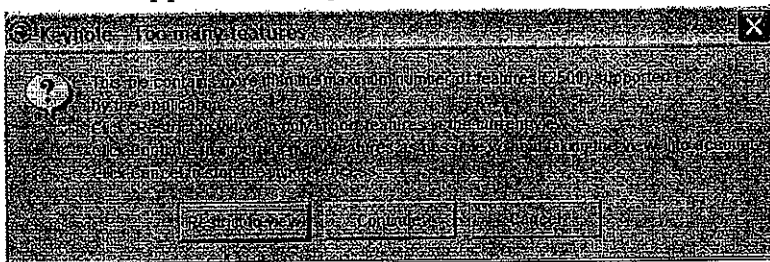
The vector image appears in the viewer, and the folder item containing the vector data appears beneath the My Places folder as a separate listing.



You can expand the folder to view the items it contains, and double-click on the item to fly to that location.



Note: Some vector data files contain very large amounts of data that cannot be imported into the Keyhole client in their entirety. In those cases, an alert appears offering a number of choices for proceeding.



Viewing Vector Data Fields

After you have imported vector data into the Keyhole client, you can use the Table Window to display the data fields contained within the vector data. To do this, select the Table from the Window menu. The window appears at the bottom of the display, listing the data fields of all placemark items in tabular form. The example below shows the data for golf course in the U.S.

Name	Address	City	State	Zip
Alamo Golf Course	10000 Alamo Blvd	San Antonio	TX	78254
Alamo Golf Course	10000 Alamo Blvd	San Antonio	TX	78254
Alamo Golf Course	10000 Alamo Blvd	San Antonio	TX	78254
Alamo Golf Course	10000 Alamo Blvd	San Antonio	TX	78254
Alamo Golf Course	10000 Alamo Blvd	San Antonio	TX	78254
Alamo Golf Course	10000 Alamo Blvd	San Antonio	TX	78254
Alamo Golf Course	10000 Alamo Blvd	San Antonio	TX	78254
Alamo Golf Course	10000 Alamo Blvd	San Antonio	TX	78254
Alamo Golf Course	10000 Alamo Blvd	San Antonio	TX	78254
Alamo Golf Course	10000 Alamo Blvd	San Antonio	TX	78254

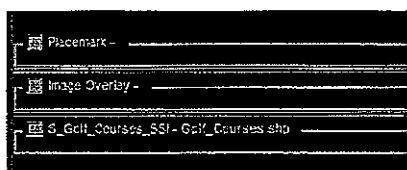
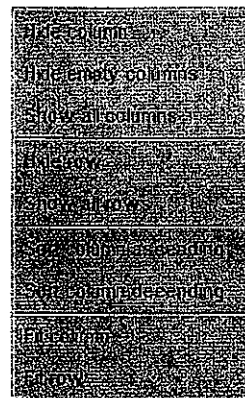
The Table View window offers the following features:

- **Sort the data by selected columns by clicking on the column header for the field you want to sort by.**
With this feature, you can easily determine the furthestmost elements of the data list and view that element in the Keyhole client viewer.
- **Single-click on an item in the table to highlight that item in the listing under the My Keyhole tab.**
- **Double-click on an item in the table to fly to it in the viewer.**

- **Right-click on any table row** to access the following pop-up menu, which you can use to sort or modify the field display.

The Table View Window displays internal data fields for all vector data currently listed as well as the placemark entries in the My Places folder. Use the scroll bar to the right of the window to scroll through numerous entries.

Alternatively, you can collapse the display of separate vector files by unchecking the check box next to the name of the vector data you want to hide. The example below shows the tables collapsed for current data opened in the Keyhole client.



Modifying Vector Data Display

When you import point and line vector data into the Keyhole client, you can use style information to modify the color and size of the points (icons) and lines. In addition, you can modify the color and size of any label information that appears next to these features.

The following example illustrates how styles can be used to modify point and line features imported from a Tiger file. It is assumed you have read the detailed steps on how to modify styles in ["Setting the Style for Placemarks and Folders"](#) on page 55 of [Using Keyhole Places](#).

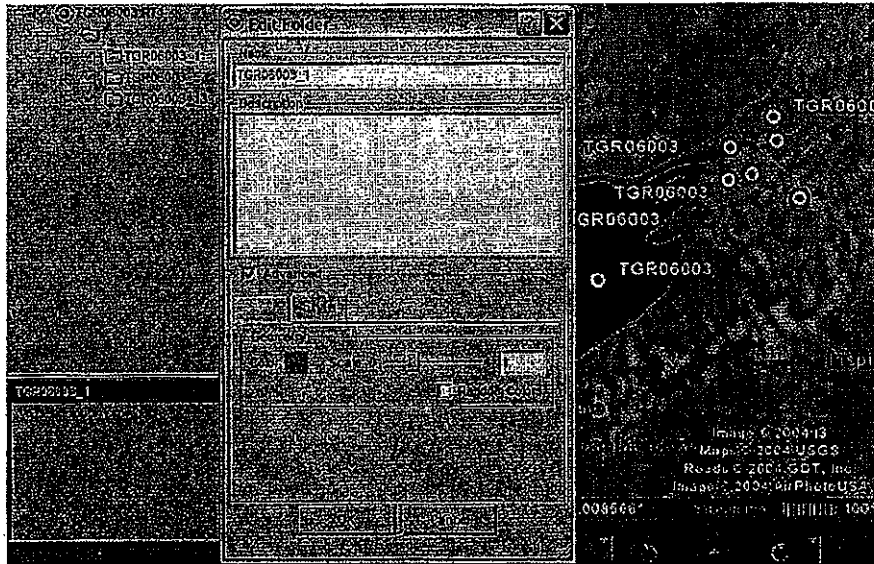
Accessing the Style Feature for a Layer

Often, the vector file that you import will contain a mixture of point and line data, each with different style features typically contained in separate layers. In those cases, the Style tab will not be available on the top-most folder.

To access the style information for a particular layer, progress down the folder hierarchy, selecting the Edit... option, until the Style tab appears. Once the Style tab is present, you know that the data within the selected folder is of the same type.

In [Figure 1](#) below, the Style tab is available on the third folder down from the parent.

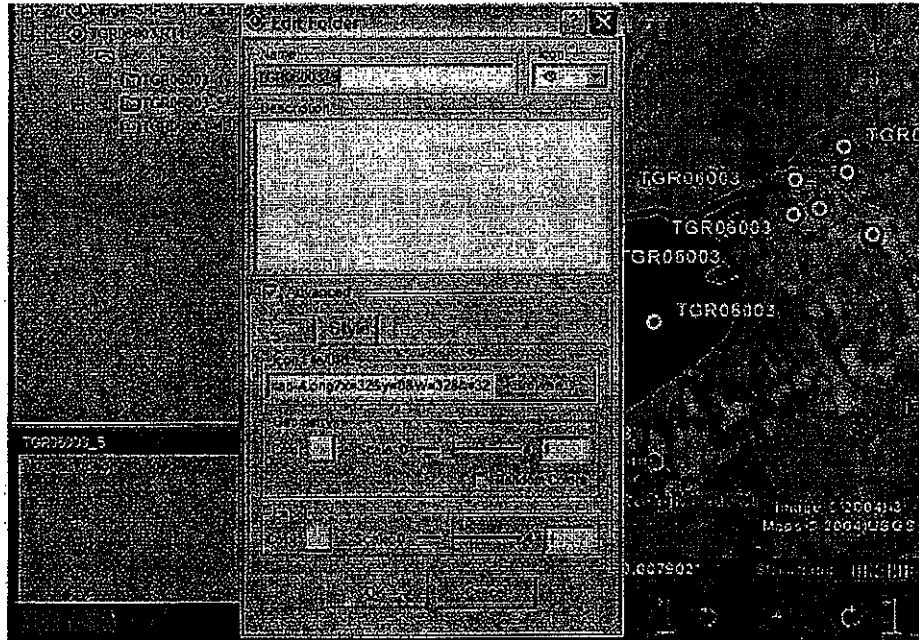
Figure 1: Styles for Geometry-only Data



Note that the information in this folder contains geometry data only, but no icon or label information. For that reason, the Style tab displays only modifications available for geometry. To see the vector data contained by the selected folder, simply deselect and select the check box next to the folder. The data in the folder will disappear and reappear. In **Figure 1** above, the selected folder contains only road data that has a default color of green and a default scale of one.

In **Figure 2** below, the next folder in the list is selected and the Edit Folder dialog produced. Here, the information in the layer consists of point data—marked by circle icons—and labels. Again, you can visually determine the items that a folder contains by deselecting and selecting the check box next to the folder.

Figure 2: Styles for Icons, Geometry, and Labels



Note that because the vector data in this folder contains geometry (points), icons, *and* labels, icon and label information is available for modification, unlike in [Figure 1](#).

Setting Folder-Level Icons, Color, and Size

Once you determine which folders have style settings available, you can set features for geometry and label data for the folder. These style features apply to all the items contained in the folder. The following example shows the items in folder TGR-60003_13 modified in the following ways:

- A Web-based URL is supplied as the default icon selected in the Icon File/URL window
- The Random Colors check box is selected, which applies random colors to the image pulled from the Web
- The scale is set to .84 times the size of the original Web-based image, which is 50 x 50 pixels. This reduces its size in the Keyhole client viewer

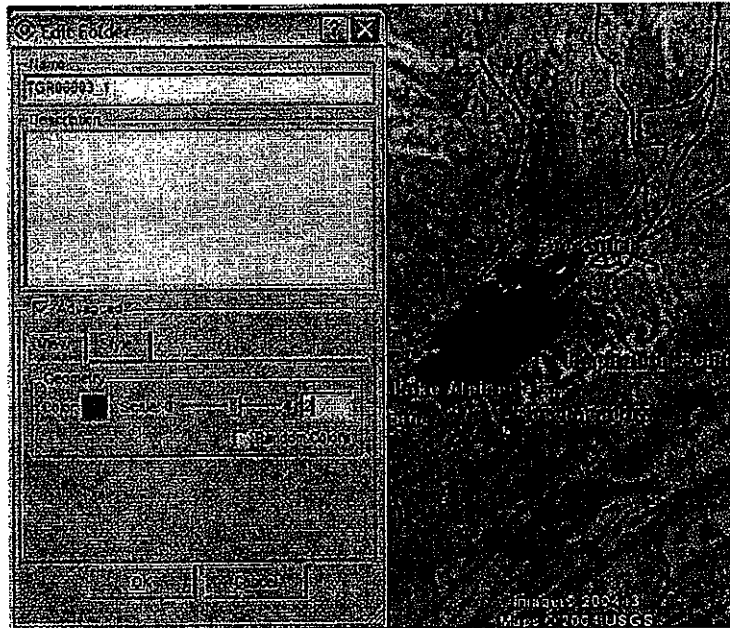
The image is a composite. On the left, a computer window titled "TGR00000" displays a grid of small, low-resolution images. Below the grid are several buttons and a search bar. The background is dark and heavily textured with noise. Various text artifacts are scattered across the right side, including "TGR00000", "TGR00001", "TGR00002", "TGR00003", "TGR00004", "TGR00005", "TGR00006", "TGR00007", "TGR00008", "TGR00009", "TGR00010", "TGR00011", "TGR00012", "TGR00013", "TGR00014", "TGR00015", "TGR00016", "TGR00017", "TGR00018", "TGR00019", "TGR00020", "TGR00021", "TGR00022", "TGR00023", "TGR00024", "TGR00025", "TGR00026", "TGR00027", "TGR00028", "TGR00029", "TGR00030", "TGR00031", "TGR00032", "TGR00033", "TGR00034", "TGR00035", "TGR00036", "TGR00037", "TGR00038", "TGR00039", "TGR00040", "TGR00041", "TGR00042", "TGR00043", "TGR00044", "TGR00045", "TGR00046", "TGR00047", "TGR00048", "TGR00049", "TGR00050", "TGR00051", "TGR00052", "TGR00053", "TGR00054", "TGR00055", "TGR00056", "TGR00057", "TGR00058", "TGR00059", "TGR00060", "TGR00061", "TGR00062", "TGR00063", "TGR00064", "TGR00065", "TGR00066", "TGR00067", "TGR00068", "TGR00069", "TGR00070", "TGR00071", "TGR00072", "TGR00073", "TGR00074", "TGR00075", "TGR00076", "TGR00077", "TGR00078", "TGR00079", "TGR00080", "TGR00081", "TGR00082", "TGR00083", "TGR00084", "TGR00085", "TGR00086", "TGR00087", "TGR00088", "TGR00089", "TGR00090", "TGR00091", "TGR00092", "TGR00093", "TGR00094", "TGR00095", "TGR00096", "TGR00097", "TGR00098", "TGR00099", "TGR00100".

For detailed steps on applying styles to icons, see ["Setting the Style for Placemarks and Folders"](#) on page 55 of [Using Keyhole Places](#).

Setting Color and Size for Line Data

If the GIS data you select contains line information, you can modify style settings to adjust the color and thickness of the selected lines. In [Figure 4](#), the scale for the line thickness is set to 2 and the color for all line data is set to purple.

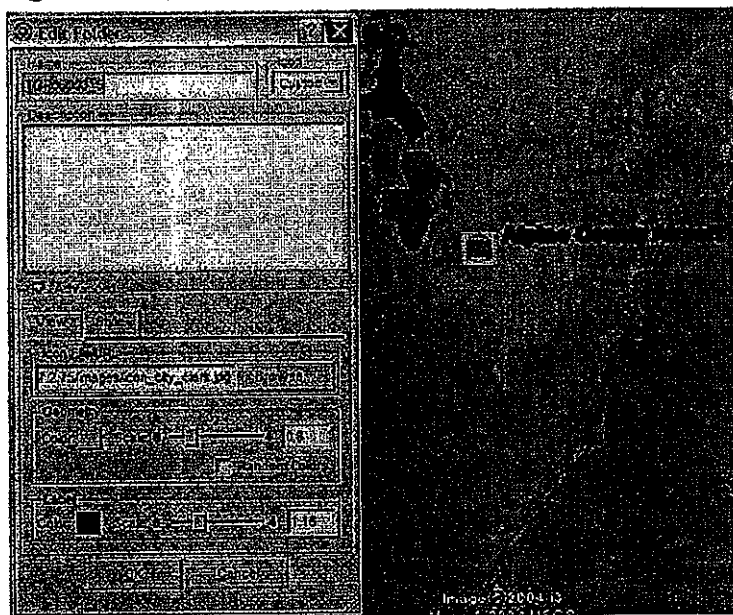
Figure 4: Style Settings for Line Data



Setting Color and Size for Label Data

If the GIS data in the selected folder also contains labels, the Style tab displays a Label field in order to modify label size and color. [Figure 5](#) below illustrates. Here, in addition to a custom icon set for point data, color has been added to the icon and the label size has been scaled up and set to red.

Figure 5: Style Settings for Label Data



Using Generic Text Files to Create Point Data

In addition to importing vector data in SHP, TAB, and other formats, you can define your own point data and import it into the Keyhole client. To do this, you create delimited text files—such as comma-separated CSV files or tab-delimited TXT files—whose data has the correct structure. This can be easily accomplished by opening your data in a spreadsheet application such as Microsoft Excel and exporting the data in either of these two formats.

Required Fields

The generic text file must contain the following fields in order for the Keyhole client to import it:

- **Appropriate Coordinate Headers**

In order for geographic coordinates to be recognized by the Keyhole client, the text file must contain column *headers* for both latitude and longitude.

These headers designate the corresponding coordinate value for the place data. The label must be written in one of two ways:

- Latitude or Lat
- Longitude or Lon

The header column labels can be written in upper or lower case. Any other notation for longitude or latitude is not recognized.

- **Decimal Degree notation for coordinate values**

It is critical that coordinate values are written in decimal degrees. DMS (degrees, minutes, seconds) is *not* supported. Points outside the valid range for decimal degrees are disregarded.

If the generic text file that you create does not conform to these specifications, the Keyhole client will not recognize the coordinate system and produce an error message to that effect.

Optional Fields

The Keyhole client treats any other column data in the generic text file as string data, with the header label as the name for that data. Keep in mind the following about field data within a generic text file:

- **Point Labels**

The first available string in the generic text file is treated as the label for the point by the Keyhole client. For example, if your comma-separated file has the following structure:

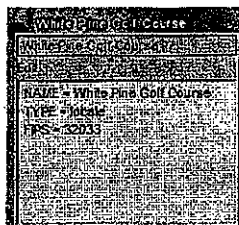
```
Latitude,Longitude,Name
39.816883,-105.037694,My Town
```

The phrase My Town is considered the label for the point and is displayed in the 3D viewer next to the point icon.

- **Description**

Except for longitude and latitude, all other fields are displayed in the Description for the point data, preceded by the column label. The following

shows the description that appears when right-clicking on a point from imported data.



In this example, the Name field is first displayed, followed by the two additional string fields associated with the point—TYPE, and FIPS.

- **Tabular data**

You can turn on the Table View for point data imported into the Keyhole client and all fields except for longitude and latitude are displayed. You can sort and display the columns using the features described in "Viewing Vector Data Fields" on page 122.

Working with Filled Polygons

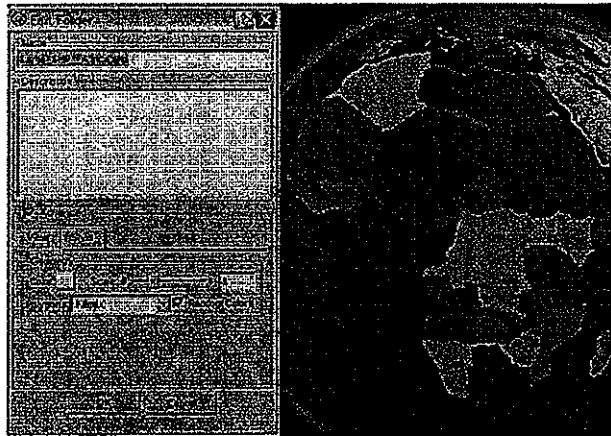
When you import filled polygons into the Keyhole client, you can use can use style information in the same was as described above in "Modifying Vector Data Display." In addition, you can set three style features specific to filled polygons:

- Filled
- Wireframe
- Filled and Wireframe

The application of these features are illustrated below. In Figure 6, the following settings are active:

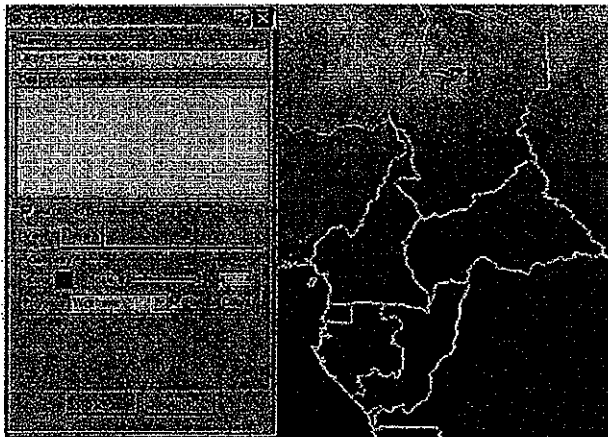
- Scale for the polygons is left to its default state of 1.
- The Random Colors check box is selected, but is further modified by the selection of an additional color which modifies the original tone of the random colors palette. This enables visual distinction between differing land areas.
- The Polygons field is set to Filled.

Figure 6: Polygon Style Set to Fill and Random Colors



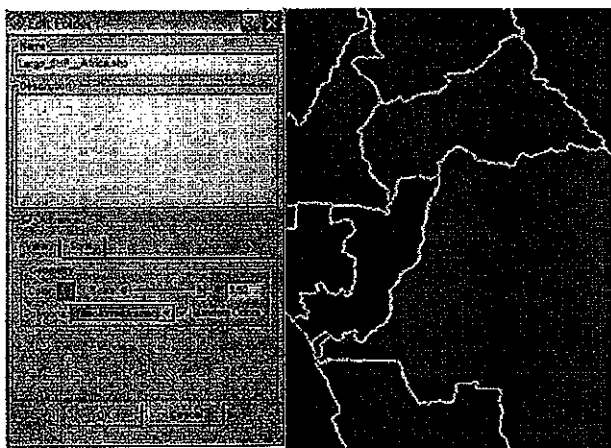
In **Figure 7**, color is irrelevant because the Polygons field is set to wireframe, which shows only the outline of the polygons with no fill. In addition, the scale is increased so that the thickness of the wireframe is more visible. This feature is particularly useful for viewing plots where the exact outline of the property needs to be visualized.

Figure 7: Polygon Style set to Wireframe



In **Figure 8** below, the Polygons field is set to Filled&Wireframe so that both the color of the fields and the outline can be seen.

Figure 8: Polygon Style Set to Wireframe with Fill



Importing GIS Imagery

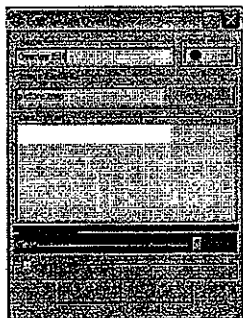
You can open GIS imagery files in the Keyhole client and have the file correctly projected over the proper map coordinates in the viewer. The Keyhole client supports the following types of GIS Imagery:

- GeoTIFF (.tif)
- National Imagery Transmission Format (.ntf)
- Erdas Imagine Images (.img)
- Atlantis MFF Raster (.hdr)
- PCIDSK Database File (.pix)
- Portable Pixmap Format (.pnm)
- Device Independent Bitmap (.bmp)
- VTP (Binary Terrain, .bt, *image file only*)

Note: All imagery files must contain the correct projection information in order to be accurately re-projected by the Keyhole client. The steps below detail the basic two-part process used in opening a GIS imagery file.

1. Use any one of the methods below to open the imagery file in the Keyhole client:
 - Select Open from the File menu (Ctrl + O).
 - Click on the Open button beneath the My Keyhole tab.
 - Drag the desired file from an explorer window and drop it over the viewer.

2. The Keyhole client then attempts to re-project the image to Lat/Lon WGS84 projection and creates an overlay with the image converted to PNG format. The overlay edit window appears.



The newly created overlay appears by default under the My Places folder in the My Keyhole tab. You can then continue to set the properties for the imagery as you would any other overlay (see "Using Custom Imagery In Keyhole" on page 89).

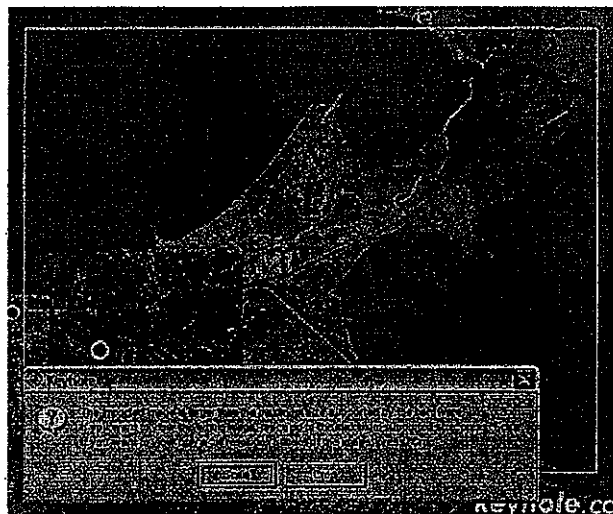
The re-projected image file is saved as a PNG file under the Keyhole client directory (e.g. C:\Documents And settings\<Username>\Application Data\Keyhole\Keyhole EC\import). The name of the PNG file is based on the source file name and the scaling or cropping parameters selected when importing the overlay. (See below for more information on scaling or cropping an image.)

The following issues should be noted when importing GIS imagery data:

- **Images that exceed maximum texture dimensions must be either cropped or scaled.**

You can determine the maximum allowable texture dimensions for your computer by selecting the About option under Help menu of the Keyhole client. The texture size for your computer will be listed next to the Max Texture size label. A dimension 2048x2048 pixels is typically supported by high-end graphics cards, while on laptop computers, the maximum dimension can be 1024x1024 or even less. Your image cannot exceed the listed dimension in either direction.

If you try to import an image file that exceeds the allowable texture dimensions, a dialog will prompt you to either *scale* or *crop* the image.



- **Scale** — This option scales and reprojects the entire image at the same time so that it conserves the aspect ratio of the input image and fits the results in texture memory. The typical size for the resultant image is 2048 pixels along the longest side.
- **Crop** — This option preserves the original resolution of the input image while creating a subset of the original input file in order to fit it in texture memory.

When you select the crop option, the viewer flies to the location of the input image and contains the extents of the input image. You then select the center point of the inset image you want to create. The client computes a maximum area centered on the selected location.

- **For larger image files, reprojection can take some time.**

If you have cropped or scaled an input image, or if you are reprojecting an image that uses more texture memory, you will see a progress meter while the reprojection occurs. You can cancel the operation at any time.

- **Images that contain no projection information are treated as ordinary overlay files.**

In this case, you can position the overlay image manually as you would an image file without geo-referenced data (see [“Positioning the Image”](#) on page 93 of [Using Custom Imagery In Keyhole](#)).

- **Images that contain incorrect or unsupported projection information will not be imported.**

In this case, a dialog indicates that the reprojection cannot be performed and the image will not be imported.

Note: Currently, files using NAD83 projection are not supported by the Keyhole client.

Saving GIS Data

Once you have imported imagery or vector data into the Keyhole client, you can save content changes made to the imported GIS data. There are a number of available options:

- **Save**
To save imported data, right-click on the topmost folder that represents the imported data, and select Save... from the pop-up menu. Navigate to the desired location to name the KML file and click the Save button.
- **Save As...**
Once you have initially saved imported GIS data, the Save menu will no longer produce a file dialog. If you want to save the data as a separate file, right-click on the item and select Save As... from the pop-up menu.
- **Revert**
Finally, you can revert any changes made to imported GIS data by right-clicking on the folder and selecting Revert from the pop-up menu. Changes made to the item after the most recent save operation are cleared.

Recording Movies Using the Keyhole Client

If you have purchased the Movie Maker module, you can use the Keyhole client to record viewer imagery in real-time, or you can record preset tours and save the imagery to a movie file. You can then make the movie file available on a web site, use it in a presentation, or send it via email. For example, you might create a movie presentation to email to people who do not have the Keyhole client.

Two file formats are supported for the capture module:

- **Windows Media Video (WMV)**
Movies saved to WMV format can be further configured for the best type of delivery, such as via a T1 web connection or over a 56K modem connection.

- **Audio Video Interleave (AVI)**

Movies saved to AVI format are currently saved to a standard AVI movie format.

Note: Movies saved to AVI format can be extremely large, to the point where a standard movie player will not be able to play back the recording. You can export AVI movies to movie editing software to edit the movie frame-by-frame and save it to the desired output for various applications.

When using the capture tool, you can create two types of movies—real-time movies and maximum quality movies. The rest of this section covers the steps needed to create a movie of either type.

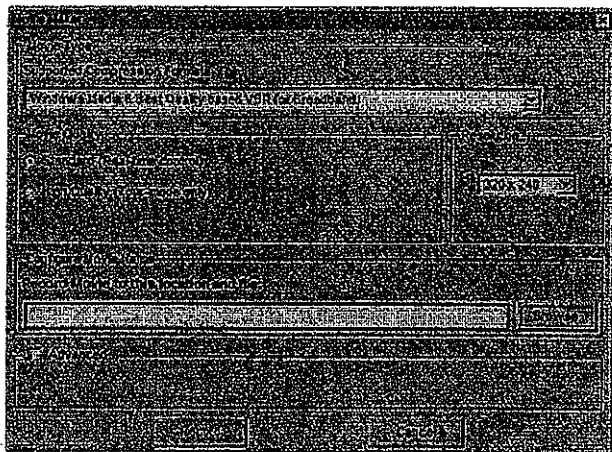
Recording Standard Movies in Real-time

Use the Standard option under the Movie Quality section of the capture tool to record movies in real time when you want to deliver your movie over the Internet or use a movie in a situation where maximum movie quality is not critical. When you record a movie using this option, you can use the navigation tools to interact directly with the Keyhole client viewer to control the display.

Follow the steps below to record a movie in real-time.

1. From the Window menu, select Movie Maker.

The Movie Maker dialog appears.



2. From the Movie Type section, choose the desired compression format for your movie.

Alternatively, you can select either the Advanced check box and select AVI for the movie type. If you choose this option, only standard AVI compression is available.

3. Select Standard as the Movie Quality.
4. Choose the resolution for your movie.

You can specify three resolutions, which indicate the width and height of the movie in pixels:

- 320 x 240
- 640 x 480
- 800 x 600
- 720 x 468 (NTSC)
- 720 x 576 (PAL)

5. Specify a name for your movie file.

Click on the Browse button next to the Record movie to this location and file input box and navigate to a location on your computer where you want to save the movie file when you are finished recording. Type in a name for the file in the file dialog window and click on the OK button.

Alternatively, you can select an existing movie file in the same format as the one you are about to create, and that file will be over-written with the contents of your new recording.

6. Click the Record button.

The movie begins recording and the Movie Maker dialog disappears to allow interaction with the 3D viewer.

Note: The Record button is only activated once you specify a movie name.

7. Navigate in the viewer to the desired places you want to record, or click on the Play button in the Tour panel if you want to record a tour.
8. To stop recording, click the Stop Recording button to stop the recording.

This dialog appears at the bottom of the 3D viewer.

Once you finish recording your movie, you can open the movie file in a media player that supports the movie format you selected and play back the movie to view the results. If you are satisfied with the results, you can post the file to a web site, a local server, or email it to other people.

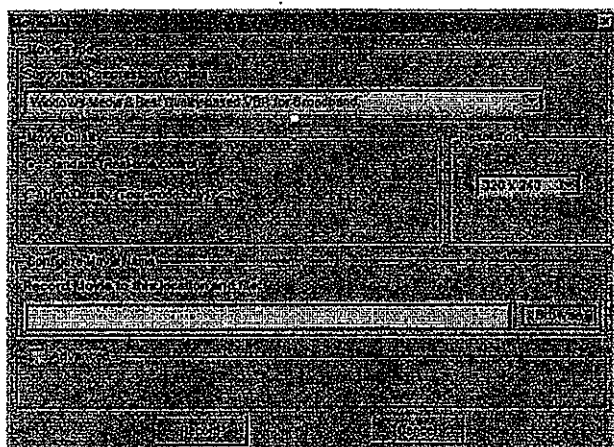
Recording Maximum Quality Movies in Tour Mode

When it is critical that your movie recording be of the maximum quality possible, you can record a pre-selected tour in the Keyhole client using the High Quality option for the Movie Quality. When this option is selected, the recording process occurs at a slower rate, because each frame is completely downloaded to the Keyhole client before it is recorded. In this way, image quality is maximized.

For this reason, high quality recordings can be done only on selected placemarks using tour mode. Follow the steps below to record a movie of this type.

1. In the My Keyhole tab, check all the placemarks that you want to be part of the movie, and uncheck those you want excluded.
2. From the Window menu, select Movie Maker.

The Movie Maker dialog appears.



3. From the Movie Type section, choose the desired compression format for your movie.

Alternatively, you can select either the Advanced check box to select AVI for the movie type. If you choose this option, only standard AVI compression is available.

4. Select High Quality as the Movie Quality.

5. Choose the resolution for your movie.

You can specify three resolutions, which indicate the width and height of the movie in pixels:

- 320 x 240
- 640 x 480
- 800 x 600
- 720 x 468 (NTSC)
- 720 x 576 (PAL)

6. Specify a name for your movie file.

Click on the **Browse** button next to the **Record Tour** to this location and file input box and navigate to a location on your computer where you want to save the movie file when you are finished recording. Type in a name for the file in the file dialog window and click on the **OK** button.

Alternatively, you can select an existing movie file in the same format as the one you are about to create, and that file will be over-written with the contents of your new recording.

7. Click the **Record Tour** button.

The movie begins recording. The **Movie Maker** dialog disappears so you can visualize the recording of the movie.

Note: Recording time occurs very slowly, since each frame is fully processed before the next one is viewed.

8. Click the **Stop Recording** button to stop the recording.

The **Stop Recording** button is available in a dialog at the bottom of the **3D** viewer.

Once you finish recording your movie, you can open the movie file in a media player that supports the movie format you selected and play back the movie to view the results. If you are satisfied with the results, you can post the file to a local server, or use it in a presentation.



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